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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/723,456	11/26/2003	Paul R. Sharps	1002	5958

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EXAMINER
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DIAMOND, ALAN D

ART UNIT	PAPER NUMBER
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1753

DATE MAILED: 09/19/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/723,456

Applicant(s)

SHARPS ET AL.

Examiner

Alan Diamond

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 27 June 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 48-98 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 48-98 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

### **DETAILED ACTION**

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on June 27, 2006 has been entered.

### ***Comments***

2. The 35 USC 112, first paragraph, rejection of claim 67 with respect to the term "at least one cell" has been overcome by Applicant's amendment of the claim.

3. The 35 USC 112, second paragraph, rejection of the claims have been overcome by Applicant's amendment of the claims other than those rejections that are set forth below.

4. The 35 USC 102(b) rejection over JP '397 has been overcome by Applicant's amendment of the claims 65, 68, 77, 88, and 93 to require that the sequence of layer in the first region and the sequence of layers in the second region are identical.

### ***Claim Rejections - 35 USC § 112***

5. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

6. Claims 48-98 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter

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which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

In claim 48, at line 8, the “substantially the same composition and thickness” limitation is not supported by the specification, as originally filed. The same applies to dependent claims 49-51.

In claim 52, at line 7, the “substantially the same composition and thickness” limitation is not supported by the specification, as originally filed. The same applies to dependent claims 53-56.

In claim 57, at line 6, the “substantially the same composition and thickness” limitation is not supported by the specification, as originally filed. The same applies to dependent claims 58 and 59.

In claim 60, at line 12, the “substantially the same composition and thickness” limitation is not supported by the specification, as originally filed. The same applies to dependent claims 61-64.

In claim 65, at line 11, the “substantially the same composition and thickness” limitation is not supported by the specification, as originally filed. The same applies to dependent claims 66 and 67.

In claim 67, at line 2, the range “as least in part” for the GaAs fabrication is not supported by the specification, as originally filed.

In claim 68, at line 9, the “substantially the same composition and thickness” limitation is not supported by the specification, as originally filed. The same applies to dependent claims 69-76.

In claim 77, at line 10, the “substantially the same composition and thickness” limitation is not supported by the specification, as originally filed. The same applies to dependent claims 78-87.

In claim 88, at line 10, the “substantially the same composition and thickness” limitation is not supported by the specification, as originally filed. The same applies to dependent claims 89-92.

In claim 93, at lines 8-9, the “substantially the same composition and thickness” limitation is not supported by the specification, as originally filed. The same applies to dependent claims 94-98.

Applicant cites the Rule 1.132 Declaration of Paul R. Sharps (Sharps Declaration) and argues that in a chemical vapor deposition process of the type described in the instant application, layer thicknesses are not the same because of variations caused by the deposition process. However, this argument is not deemed to persuasive because the word “substantially” is never used in the originally filed disclosure to describe any part of the invention. The word “substantially” introduces a “fudge factor” that opens up whatever it is modifying to interpretation. Such interpretation is not supported by the original disclosure. If Applicant had wanted to introduce a fudge factor because things aren't perfect, it should have been done when the application was originally filed.

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7. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

8. Claims 48-98 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 48, at line 9, it is not clear what is to be encompassed by the term "substantially the same composition and thickness". The same applies to dependent claims 49-51.

In claim 52, at line 7, it is not clear what is to be encompassed by the term "substantially the same composition and thickness". The same applies to dependent claims 53-56.

Claim 57 is now indefinite because it is not clear what is meant by the term "a bypass diode and directly ..." at line 3. The same applies to dependent claims 58 and 59.

In claim 57, at line 6, it is not clear what is to be encompassed by the term "substantially the same composition and thickness". The same applies to dependent claims 58 and 59.

In claim 60, at line 12, it is not clear what is to be encompassed by the term "substantially the same composition and thickness". The same applies to dependent claims 61-64.

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In claim 65, at line 11, it is not clear what is to be encompassed by the term “substantially the same composition and thickness”. The same applies to dependent claims 66 and 67.

In claim 68, at line 9, it is not clear what is to be encompassed by the term “substantially the same composition and thickness”. The same applies to dependent claims 69-76.

In claim 77, at line 10, it is not clear what is to be encompassed by the term “substantially the same composition and thickness”. The same applies to dependent claims 78-87.

In claim 88, at line 10, it is not clear what is to be encompassed by the term “substantially the same composition and thickness”. The same applies to dependent claims 89-92.

In claim 93, at lines 8-9, it is not clear what is to be encompassed by the term “substantially the same composition and thickness”. The same applies to dependent claims 94-98.

With respect to the term “substantially the same thickness” being indefinite under 35 USC 112, second paragraph, applicant cites the same arguments used above with respect to this term and 35 USC 112, first paragraph. However, these arguments are not deemed to be persuasive because it is not clear how close to having the same thickness the corresponding layers must have in order to be considered to have “substantially the same thickness”.

***Claim Rejections - 35 USC § 102***

9. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

10. Claims 48-66, 68-70, 72, 73-78, 80, 84-90, and 92-98 are rejected under 35 U.S.C. 102(b) as being anticipated by Taylor, GB 2346010 A. See Figures 1c and 1d and pages 5-6 of Taylor, which set forth the features of the instant solar cell semiconductor device. Said Figures 1c and 1d of Taylor clearly show the first subcell (5) and the protection diode (11) have the same sequence of layers with the same thickness. Since Taylor teaches the limitations of the instant claims, the reference is deemed to be anticipatory.

11. Claims 65-92 are rejected under 35 U.S.C. 102(b) as being anticipated by Ho et al, WO 99/62125. See Figure 14B which has the instant multijunction solar cell with Ge substrate, and GaAs (1412,1414,1416) and GaInP (1422,1424,1426) solar cells, and integral bypass diode (1410) that is integral with a portion of the GaAs solar cell and laterally spaced therefrom. The GaAs solar cell and integral bypass diode have the same sequence of layers with the same thickness. Since Ho et al teaches the limitations of the instant claims, the reference is deemed to be anticipatory.

***Claim Rejections - 35 USC § 103***

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and



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the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

13. Claims 48-98 are rejected under 35 U.S.C. 103(a) as being unpatentable over Taylor, GB 2346010 A, in view of Marvin et al, "Evaluation of multijunction solar cell performance in radiation environments, Conference Record of the 28<sup>th</sup> Photovoltaic Specialists Conference, pages 1102-1105, published 15-22 September 2000, and Lillington et al, U.S. Patent 5,853,497.

See Figures 1c and 1d and pages 5-6 of Taylor, which set forth the features of the instant solar cell semiconductor device. Said Figures 1c and 1d of Taylor clearly show the first subcell (5) and the protection diode (11) have the same sequence of layers with the same thickness. Taylor teaches that its substrate (1) can be GaAs (see page 5, line 4). Taylor does not specifically teach that its substrate (1) can be Ge, and that its solar cell (5) is GaAs and its solar cell (2) is InGaP. Marvin et al teaches the conventional GaInP/GaAs/Ge two junction device wherein the Ge is the substrate (see the entire document). Lillington et al is relied upon for showing what is well-known in the art, i.e., that GaInP/GaAs can be grown on either a GaAs substrate or a Ge substrate (see col. 1, line 65 through col. 2, line 16). It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used a Ge substrate in Taylor's multijunction solar cell in place of the GaAs exemplified by Taylor, and to have used GaInP and GaAs for Taylor's solar cells because GaInP/GaAs can be grown on either a GaAs substrate or a Ge substrate as shown by Lillington et al, and because the GaInP/GaAs/Ge two junction device wherein the Ge is the substrate is conventional in the art, as shown by Marvin et al.

14. Claims 60-98 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ho et al, WO 99/62125.

See Figure 14B which has the instant multijunction solar cell with Ge substrate, and GaAs (1412,1414,1416) and GaInP (1422,1424,1426) solar cells, and integral bypass diode (1410) that is integral with a portion of the GaAs solar cell and laterally spaced therefrom. The GaAs solar cell and integral bypass diode have the same sequence of layers with the same thickness. Ho et al's electrical interconnector C-clamp (1442) corresponds to the metal layer in independent claims 60 and 93. When the C-clamp is connected to front metal (1440) it will be a layer on said (1440). Likewise, when the C-clamp is connected to the back metal (1430), it will be a layer on said (1430). Indeed, Ho et al's Figure 11 shows how the C-clamp (1102) provides for a layer on front metal (702) and a layer on back metal (802). Ho et al teaches the limitations of the instant claims other than the difference which is discussed below.

Ho et al does not specifically teach that said electrical interconnector C-clamp is metal. However, in the absence of anything unexpected, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used metal for Ho et al's electrical interconnector C-clamp because said C-clamp is electrically conductive. Ho et al's metal C-clamp 1442 is a layer in metal layer in the device since it forms layers on said front metal 1440 and said back metal 1430.

### ***Response to Arguments***

15. Applicant's arguments filed June 27, 2006 have been fully considered but they are not persuasive.

Applicant argues that Taylor states that the trench in Figure 1C serves to isolate protection diode 11, and that page 5, line 16, specifically mentions external connection of protection diode 11. Applicant argues that even if layer 7 is considered connected to the solar cell, that means that only one end of the bypass diode is connected to the solar cell, not both ends. However, this argument is not deemed to be persuasive because the Examiner maintains that etching though layer (7) is an optional alternative and need not be done (see Figure 1d; and page 6, lines 1-2). In any event, even with a trench formed at (13) in Figure 1C, there would be electrical connection via the GaAs substrate (1), which is electrically equivalent to layer (7) (see page 5, lines 3-18). Furthermore, the instant claims do not require both ends of the diode to be connected to the solar cell.

Applicant argues that Ho et al's C-clamp is not a deposited metal layer. However, this argument is not deemed to be persuasive because when Ho et al's C-clamp (1442) is placed on the semiconductor structure it is deposited on the semiconductor structure. When something is deposited, it is required to have been put, placed, or set down somewhere.

16. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alan Diamond whose telephone number is 571-272-1338. The examiner can normally be reached on Monday through Friday, 5:30 a.m. to 2:00 p.m. ET.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on 571-272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Alan Diamond  
Primary Examiner  
Art Unit 1753

Alan Diamond  
September 17, 2006

A handwritten signature in black ink, appearing to read 'Alan Diamond', with a stylized flourish at the end.